Omega Group Meeting

Hong Ma
Jan 6, 2012

Outline

- Research activities in the group
- Budgets and Reviews
- Safety (Sue Duffin)
- Discussions

Group Composition

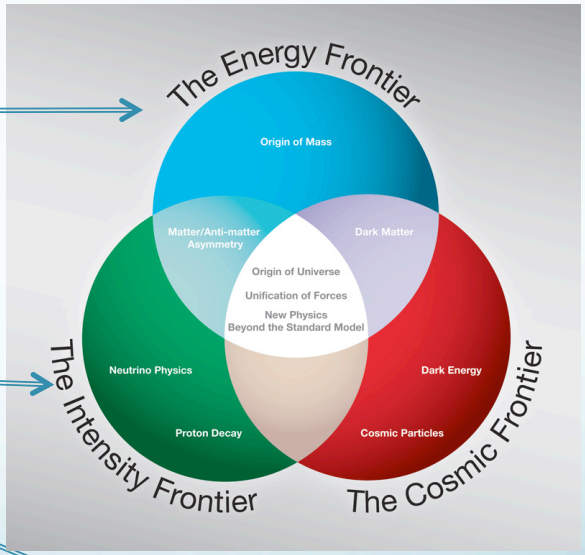
- Current Staff
  - Permanent Scientific Staff: 13
  - Termed Scientific Staff: 3
  - Professional Staff: 4
  - Postdocs: 5
  - Designer/Engineers 3
  - Technicians 4
  - Administration Assistants 2
  - PhD Students 2
  - + A few associated members
- Recent changes:
  - Departure in 2011: Bruce, Fabian
  - Arrival in 2011: Yichen, Nathan, Xueye
  - Kostas has accepted a Fellowship position in Univ of Birmingham, UK
    --------- CONGRATULATIONS----------

Our Roles in HEP

- Propose, construct, and operate HEP experiments
- Analyze data from the experiments to advance our understanding of fundamental laws of physics.

ATLAS, D0

MicroBooNE, LBNE
g-2, Mu2e



Detector Technology

Physics Analysis

ATLAS Operations

- Liquid Argon Calorimeter
  - Electronics, Calorimeter Trigger, Run Coordination, Calorimeter Performance
  - 4 in LAr Steering Group
    - Denis, Francesco, Stephanie, HM (LAMG)
- Muon Spectrometer
  - CSC Operation (Vinnie)
- Trigger
  - Trigger Coordination (Srini, 2010-2011)
  - Jet trigger slice coordinator (Michael, since 2010)
  - Trigger Software and Operation

ATLAS Physics

- A very exciting year of LHC physics
  - ATLAS published/submitted 100 papers since the LHC collision data taking,
  - Released 265 conference notes since data taking
- Leadership roles in ATLAS
  - SUSY convener (George 2010-2011), Higgs ZZ Subgroup convener (Kostas 2011-2012)
- Search for Higgs boson
  - ZZ to 4leptons, llqq, WW to lνlν, ATLAS/CMS Higgs combination
- Search for Supersymmetry
  - All hadronic final state, STOP
- Standard Model measurements
  - WW to dilepton, tt-bar to tau+lepton
- Search for Exotic final states
  - Lepto-quarks, dibosons

ATLAS Upgrade

- ATLAS is defining the Phase I upgrade program
  - To be ready for Long Shutdown I (2018)
  - Leadership roles in ATLAS (Francesco)
  - Calorimeter trigger upgrade
    - Improve L1 calorimeter trigger in high luminosity with fully-digital readout
  - Muon Small Wheel upgrade
    - Micromegas is one of possible detector technology choices
    - Readout electronics
- Long term Phase 2 upgrade (2022)
  - Silicon strip detector for the new tracker
  - Full replacement of LAr readout electronics
  - Will be supported by the Collider Detector Generic R&D

US ATLAS

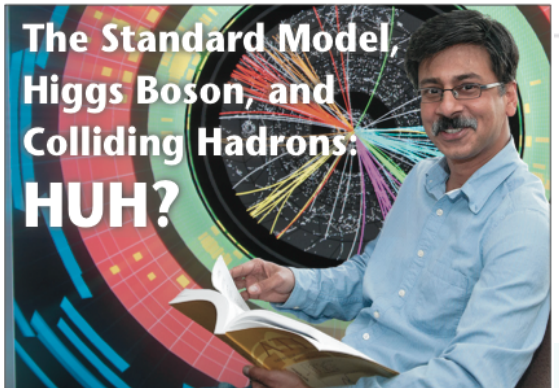
- Current roles in US ATLAS structure
  - L2 manager for Technical Coordination (Vinnie)
  - L2 manager for Muon upgrade (Vinnie)
  - Physics Analysis Support Center (HM)
- Srini will replace Howard as the Deputy Operations Program Manager in Sept 2012.
- Much of our detector M&O and R&D funding comes from US ATLAS Operations program.

"467th Brookhaven Lecture: Experimental Particle Physics in the LHC Era and Possible Implications for Development in Africa""

Length: 00:58:32

Video of this event is available via WBNL (Rea

Assamagan presented a talk titled "Experimental Particle P
Possible Implications for Development in Africa," in which h
at the LHC and ATLAS, and how African institutes' particip
to the goals of the African School of Physics.



Brookhaven Lab and the Search for the Higgs

By Kostas Nikolopoulos

Today's public seminar at CERN, where the ATLAS and CMS collaborations presented the preliminary results of their searches for the Standard Model (SM) Higgs

Thursday, April 21, 2011
Particle Physics Seminar
"Recent SUSY results from ATLAS"
George Redlinger, BNL

Tuesday, April 26, 2011
Physics Colloquium
"Recent results from ATLAS"
Michael Begel, Brookhaven Na

Tuesday, December 20, 2011
Special Particle Physics Seminar
"Search for a Standard Model Higgs Boson at ATLAS"
Scott Snyder, Brookhaven National Laboratory

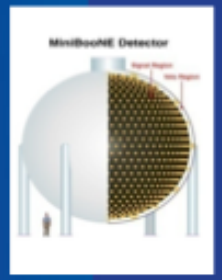
7 Talks at International Conferences in 2011

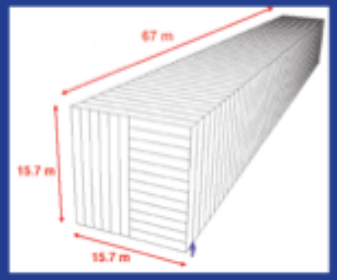
D0 Experiment

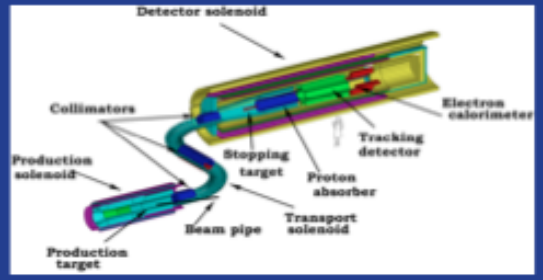
- Tevatron finished its 28 years of operation in Sept 2011
- BNL has made major contributions to the D0 detector and physics
  - Calorimeter, forward preshower, software
  - top quark, tau, MSSM higgs
  - Currently Abid leads Joint High-Mass Higgs and Beyond the Standard Model Higgs physics group
- Expect our involvement in D0 to conclude after winter conferences this year

Pier Oddone at DPF2011

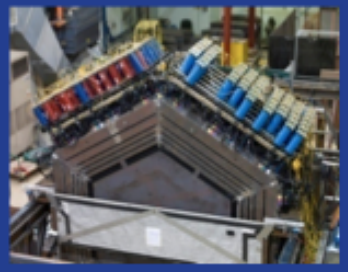
Fermilab and the intensity frontier

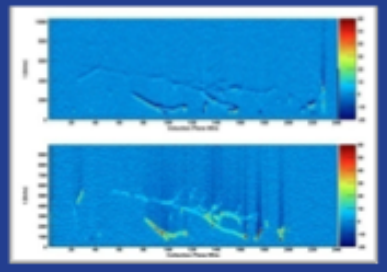


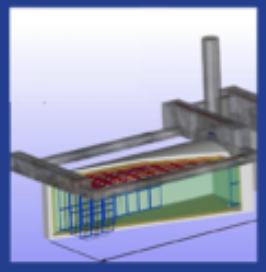




MINOS MiniBooNE MINERvA SeaQuest	NOvA MicroBooNE g-2 MINERvA MINOS+ SeaQuest	NOvA g-2 LBNE Mu2e	Project X+LBNE μ, K, nuclear, … ν Factory ??







33 DPF-2011, Providence, RI, August 13th, 2011 Fermilab

– We will continue to press for implementation of the currently envisioned Intensity Frontier program, e.g.: LBNE, Mu2e, g-2, MicroBooNE, Belle-II,…

Jim Siegrist at Intensity Workshop

MicroBooNE

- 100-ton Liquid Argon Time Projection Chamber
  - Measure low energy neutrino cross sections
  - CD2 approval last Oct, CD3b next February
- BNL plays a leading role in the construction project
  - Instrumental in the initiation and the design
  - Deputy project manager for active detector system (Craig)
  - Level 2 manager of the FE electronics system (Hucheng)
  - Level 2 manager for cryostat (Sue)
- Closely related to the noble liquid detector R&D effort
- Will strengthen efforts in both the electronics and analysis
  - A postdoc position is open for electronics and detector

Long Baseline Neutrino Exp

- The ultimate experiment on neutrino oscillation
  - DOE CD0 approval in Jan 2010
  - DOE CD1 Review in April 2012
  - Two alternative technologies: WC and LArTPC
- We play critical roles for the LArTPC
  - A natural continuation of the MicroBooNE effort
  - L3 manager for LArTPC (Craig and Bo of Instrumentation Div)
    - Design and construction of the active detector and electronics
- Technology choice before CD1?
  - LBNE Executive Committee recommendation:
    - Both WC and LArTPC could achieve the goal
    - Preference for WC, but will support final choice of technology
  - Project/FNAL/DOE will make the final decision (when?)
  - The decision will have impact the scope of our LArTPC effort
    - Detector R&D effort will continue, 1kton detector in proposal stage.

Muon g-2 at FNAL

- Aim to measure the muon g-2 to 0.14 ppm, a 4-fold improvement over the AGS E821 experiment.
  - Moving the g-2 ring from BNL to FNAL
  - CD0/CD1 in 2012, CD4 by 2016
- BNL responsibilities in the experiment
  - Electrostatic Quads (Yannis)
  - Disassembly transport (Bill)
  - New ideas to improve the systematics
    - beam and spin dynamics tracking,
    - lost muon and the coherent betatron oscillations
    - Muon EDM

Mu2e at FNAL

- Aim to improve the sensitivity to μ-to-e conversion by 10^4
  - Similar design to MECO of RSVP at AGS
  - Still in early proposal stage
- BNL contributions:
  - CSC as detector choice for cosmic ray veto counters (Vinnie & Peter Yamin)
  - Improvements in the detector design (Yannis)
    - optimizing the muon stopping target geometry
    - improving background particle rate in transport solenoid
- Strengthening the Muon experiment efforts
  - Supplemental FWP was submitted to DOE last Nov to request an additional scientific staff on both muon experiments
  - Preliminary approval, a staff position is open.

Generic Detector R&D

- Noble Fluid System
  - fundamental physics and electronics for next generation of noble liquid TPCs
  - Also supported by BNL LDRD for 3 years
  - Expect measurements on LAr properties soon.
- Silicon tracking detectors
  - Radiation hard sensors
  - Radiation Hard Power Electronics
  - Low Mass Silicon Support/Cooling Structures
- High rate DAQ & triggering
- Micromegas detector for tracking

Other activities

- Outreach activities
  - Mariachi, QuarkNet, summer student programs, public lectures(Helio, George, Thomas, Bill, Yannis…)
  - Physics in Africa (Ketevi)
    - African School of fundamental physics and its applications, 2011 and 2012

- Storage Ring EDM experiments (Yannis and Bill)
  - proposal for a proton EDM experiment at BNL with 10^{-29} e-cm sensitivity was submitted to DOE NP last November.

Regular Meetings

- ATLAS Physics Analysis Meeting (HM)
  - Weekly on Friday at 11am Eastern Time
  - Discussion of on-going ATLAS data taking and physics analysis
- Technical Staff Meeting (Francesco and Sue)
  - Safety, work distributions,
  - As necessary.
- Detector R&D (Vinnie)
  - ~ monthly meeting on technical progress in detector R&D

Budgets

- We are supported by a variety of funding sources
  - Core research program (~$6M)
    - Energy Frontier, Intensity Frontier, Generic Detector R&D
  - Project funds
    - US ATLAS M&O + R&D (~ $1.8M)
    - MicroBooNE (~$1.3M) +LBNE (~ $1M ?)
    - Muon experiments (~ $0.1M)
    - LDRD (~$0.3M)
    - Project X (?) , Collider Detector Generic R&D (?)
- FY12 HEP budget is close to the Pres. Request
- Field work proposal (FWP)
  - Planning at this time of the year for the next 3 years
- Budget briefing at DOE on ~ Feb 22 for FY13-15
  - We are asked to provide plan for different funding scenarios
  - The guidance: “do not indicate growth”.

Reviews

- DOE HEP comparative review of the labs in each research area in 3-year cycle, usually in the summer.
  - 2012: Proton Energy Frontier and Generic Detector R&D
  - We need to prepare research proposal,
  - reviewed and graded by a panel
- Annual Site Visit
  - Review of full HEP programs annually
  - Last review in Sept 2011 (virtual site visit)
- Recent reviews are more detailed, down to the work of individual scientists
  - Need everyone's help to prepare for the reviews!

Outlook

- Exciting LHC program will keep us busy for a long time
  - 2012 LHC data should finally answer the standard model Higgs question.
  - A rich physics program ahead of us, 14 TeV in 2015
  - It is critical for us to take a lead role in the ATLAS upgrade projects
- Intensity frontier experiments at FNAL are the focus of the future US HEP program
  - Our expertise is having an impact
  - Potential growth areas.
- Challenging budget uncertainties

Thank you for the hard work Enjoy the Pizza

- Thanks to Linda for arranging the lunch
- Thanks to the senior scientific staff for contributing